Mangrove Forest Biomass Estimates, Community Structure and Classification in the Nigerian Niger Delta.

Chukwuebuka Nwobi

University of Edinburgh, Global Change Research Institute, School of Geosciences, United Kingdom
(c.j.nwobi@sms.ed.ac.uk)

Mangrove forests are important coastal ecosystems because they provide cultural, provisional and regulatory services but they are threatened by exploitation, urbanization and sea level rise. Nigerian mangroves are hotspots of oil pollution, development, deforestation and invasive species, especially in the Niger Delta. Hence, mangroves in Nigeria should be studied to understand the effects of these land use changes on the biomass, despite research challenges. I assessed Niger Delta mangrove forests in terms of aboveground biomass, community structure and how various economic activities in these regions affect them. Classification of my study region was also done to differentiate mangroves from the invasive species, Nipa palm; and the relationship between biomass and radar backscatter was established. 25 square plots in 3 sites were sampled in 2 states of the Niger Delta; ground control points were also collected across the Niger Delta for classification using optical and radar data products from ALOS PALSAR and Sentinel. Initial results show that a total of 6.3 ha of mangrove area was sampled with mean AGB of 83.73 ± 61.4 t ha^{-1}. An overall accuracy of 99% and kappa coefficient of 0.99 was derived from the classification of the study area using maximum likelihood method. However, the commission of Nipa palm was about 30% and can be improved. The relationship between radar backscatter and plot estimates of AGB showed the highest R square value of 57% and p-value < 0.001 from a combination of the VV: VH Sentinel 1 radar and HV: HH ALOS PALSAR data. The site with the highest biomass was found in the protected site plots and the lowest was found on the site were urbanization was actively taking place. DBH size distribution and biomass contribution also gave evidence to this also. The results show that the effects of exploitation in the Niger Delta mangrove forests are underestimated and underreported, hence, the need for an updated mangrove biomass monitoring the Niger Delta. A new mangrove biomass map is possible in the Niger Delta based on these results which will be important to stakeholders in planning mangrove conservation.